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opportunities for ascertaining their natural condition are growing less every year, so no time should be lost.

We have very little definite knowledge of the flowering periods, modes of dissemination, natural habitats and boundaries of the ranges of some of our most familiar plants. To illustrate some of the many taxonomic, geographical, ecological, phænological and statistical problems which now confront us, a list of about twenty illustrative questions was submitted, and recommended to the consideration of the members of the club. Answers to them, or suggestions of similar questions, were earnestly invited.

The paper will be published in full in a future number of *Torreyia*.

Exhibition of Specimens recently collected in Jamaica, with Remarks: N. L. BRITTON.

A specimen was exhibited of the nest of the Jamaica swift made from the downy seeds of species of *Tillandsia*, and presented to the New York Botanical Garden by F. B. Sturridge, Esq., of Union Hill, Moneague, Jamaica.

Fruits were also shown of the Jamaican species of *Hernandia*, preserved in formalin, together with herbarium specimens from the same tree, found by Mr. William Harris and myself on the wooded hill near Dolphin Head, a mountain near the western end of Jamaica, and collected March 21, 1908. This tree is one of the largest of the Jamaican forests and apparently either very rare or very local in its distribution. It attains a height of at least 30 meters and a trunk diameter of over a meter. It has not been very definitely known to botanists, inasmuch as Patrick Browne in the "Civil and Natural History of Jamaica," published in 1756, knew of its occurrence there only by rumor, and it is not recorded for Jamaica by Grisebach in the "Flora of the British West Indian Islands." In the treatment of the genus in De Candolle's "Prodromus," Meissner attributes it to Jamaica on the authority of Patrick Browne, but Mr. Harris, in his extensive exploration of the forests of the island, had not been able to find much of it until this discovery near

Dolphin Head, where a tree some 20 meters high was cut down and fine fruiting specimens obtained. An examination of these specimens in comparison with those of the other species indicates that the Jamaican tree differs from those of the other West Indies and of the East Indies, and should be defined as a species new to science.

C. STUART GAGER,
Secretary

DISCUSSION AND CORRESPONDENCE

THE ADAMS FUND

It is needless to repeat in this paper what the Adams Act is, except to emphasize that the appropriation was made for the purpose of conducting original investigations in all branches of agricultural science, and that those institutions and investigators that draw from the funds keep before them the obligation under which they are placed when they accept the conditions of the funds. There is, I think, a certain class of workers in the experiment stations who fear that the work under the Adams Fund will prove too technically scientific, and therefore seem to think that greater latitude should be accorded each station in the use of its pro rata of the funds.

During the many years that experiment stations have existed in this country, with few exceptions, they have done mostly demonstrative work, and results have necessarily been empirical, and admitted only of local application. Many of them have spent their time and energy farming, and making special experiments with fads, trying to eradicate "foggy notions" about the effect of the dark and light nights on planting ordinary farm crops, or satisfying any popular belief. The demands that have arisen from time to time among the farmers, especially the southern farmers, have been of this nature, and have determined in a great measure the progress of some of the stations. Even now, we sometimes hear arguments to the effect that experiment station work should never overshoot the heads of the average farmers, and even in scientific work we should try to simplify the work so the farmer can understand it.

I am by no means a favorer of anything

done at experiment stations that does not eventually redound to the good of the farmer, but, at the same time, I would have uppermost in mind what really benefits the farmer, not so much what he thinks benefits him. Institutions of this kind are organized for the purpose of deriving far-reaching conclusions, and the schemes to be worked out should be determined by those who have made a deep study of agriculture in its broadest sense, and not by those who have had handed down to them the ideas they daily put in practice. Agriculture is the greatest of all vocations, at least of all industries, and yet it is only recently that science has been directed along agricultural lines, and it has probably been well for the work that the above conditions have existed. In the first place, there were few men who were prepared to undertake the work, and, second, appropriations have been hard to get.

It is now twenty years since the organization of experiment stations, and a new era of progress and possibility is upon us and we should dismantle ourselves of the old robes of skepticism in regard to agricultural sciences. Some of the stations have always had high ideals, many of them have been bordering the scientific phase of agriculture for a good many years, but others have always held and still hold to the idea that they must busy themselves trying to satisfy the immediate demands of an uneasy public. Stations that do not busy themselves with the fundamental laws of agricultural science may always expect to have this kind of work to do; for the farmer finds out what is wrong before such stations are able to give out something more promising. In that case the farmer is the leader instead of the stations.

This condition was seen and fully contemplated by Mr. Adams, when he introduced a bill to increase the annual appropriations for the national and state experiment stations, else the special clause providing for a specific phase of station work would never have been incorporated in the bill. If all stations had conformed to the high ideal that some of them have always maintained, it would never have occurred to him that the funds must be set

aside for research work. He knew as we all know that the practical side of station work is indispensable, not only to the good of the farmers of the states, but to the theoretical work as well, and feeling, as I have intimated before, that many of them were depending altogether on this phase of the work, he set about to raise the standard by specifying that the new funds must be used to prosecute original research work, and to make his purpose carry he had the funds put into the hands of the Secretary of Agriculture, whose duty it is to see that the said funds shall not be misspent.

By virtue of these limitations, it becomes the duty of those who enter into the work to confine themselves strictly to the scientific phase of agricultural work. If they carry out the original purpose of the funds, they must in the course of their work hit upon the basic or fundamental principles that in the end determine real progress. The day of experimentation must yield to the inevitable day of investigation, and the investigator must not undertake a diversity of projects, but work along narrow lines that he may be fully able to concentrate his mind on the purely technically scientific phase of his work. In fact, there is little room to doubt that a project is admitted under the provision of the funds, only as the investigator interprets it from the standpoint of science. It may have practical application, but must be scientific. It may be work on old themes, but it must be a new phase of them.

In view of the considerable confusion brought about by the use of the Adams Fund at the stations, I wish to emphasize that no greater mistake can be made than to preach immediate application of results from those who are working under it. This was not contemplated by Mr. Adams. Farmers have to be educated gradually to an acceptance of any valuable scientific truth in agriculture, and to persuade them that they should keep abreast with men of science is to demoralize them in the extreme, and fill their minds with skepticism. When larger truths have become feasible, the farmers will be the ones to reap the benefit, and until they have become feasible,

let them be confined to the scientific workers. The man or institution that has not already begun to lay broad foundations may well be considered among the condemned. Only those who have the true spirit of investigation will win out under the Adams Fund. Instead of winning out by popularity, they will win out in spite of popularity, if they must work for popularity. Being able to reduce science to the popular is no indication of success, whether it be astronomy, meteorology, physiology, pathology, botany, bacteriology, medicine, or what-not. The fact that any truth becomes popular in any degree should be because of its broad application, and should, and generally does, bespeak years of sacrifice on the part of some investigator. Whatever is worthy to be called truth is worthy the best there is in us, and especially should this be so in agricultural science, where results will benefit almost the whole of the human race.

R. J. H. DeLOACH,
Botanist

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LIKELY PLACES FOR EVIDENCE AS TO THE HISTORY OF THE EVOLUTION OF THE ANTHROPOID APES AND PRIMITIVE MAN

THE recent discovery of the chimpanzee in a part of Africa where it had not been previously known to exist enables us now to define a few regions in which the gorilla, the chimpanzee and the pygmies are found in conditions suggestive of the possibility of the discovery of fossils of their ancestry in a good state of preservation.

Until these new loci could be determined, the geological character of other regions where one of the three occurred was not such as to encourage hopes of the kind.

The writer is engaged upon the determination of these likely places, and wishes now to call attention to the matter, so that in the exploration going on in Africa the scientific importance of the matter may receive due attention. The pygmies are now known to have existed practically *in situ* for three thousand years, and there is abundant antecedent probability that the two great anthropoids

there now have been there for as great or greater a length of time.

Indeed, the writer believes that it will soon be possible to indicate localities, of less than a few hundred square miles in area, in which the likelihood of discovering these fossils is very great. His own explorations have partly been responsible for this conclusion, and an increasing knowledge of the geology and petrology of the great African crest has helped to augment the surmise. Correspondence on this subject is invited.

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SPECIAL ARTICLES

A SIMPLE REFLECTION GONIOMETER

THE lack of a reflection goniometer has probably prevented many persons from measuring crystals and has consequently limited the study of crystals. The use of the contact goniometer is confined to fair-sized crystals with faces of appreciable size. Minute faces even on large crystals can not be measured by the contact goniometer.

In order to encourage the study of crystals the writer desires to describe a simple and convenient reflection goniometer which can be made of materials costing but fifty cents. It is simply Penfield's cardboard contact goniometer, model B,¹ fitted with an axis. The axis, upon one end of which the crystal is mounted, is provided with a pointer by which the interfacial angles may be read off.

The accompanying figure is a diagrammatic cross-section of the apparatus. *cd* is the cardboard protractor, consisting of a semi-circle of seven cm. diameter. *aa'* is the axis which is a cylindrical piece of wood four mm. in diameter and about five cm. in length. This axis must fit snugly into the eyelet of the protractor so as not to wobble when it is revolved. On one end of the axis is a piece of wax, *w*, upon which the crystal is mounted. *p* is a fine piece of wire attached to the axis, by means of which interfacial angles are read off on the protractor.

¹ Sold by E. L. Washburn & Co., New Haven, Conn. (price, 50 cents). It is better to cut off the celluloid arm of the protractor.